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MAY 17 1996 YSI MODEL 3682 ZOBELL SOLUTION  
INSTRUCTIONS

The YSI 3682 Zobell Solution is shipped with instructions, a certificate of traceability, and a Material Safety Data Sheet.

**DESCRIPTION:**

The YSI 3682 Zobell Solution is a reference solution that is used to verify the performance characteristics of redox potential cells such as the YSI 3540 ORP Electrode Assembly. This product is packaged in dry form and must be reconstituted before use. Each amber bottle contains 75% Potassium Chloride, 14% Potassium Ferrocyanide Trihydrate and 11% Potassium Ferricyanide by weight.

The reconstituted solution has a maximum shelf life of 30 days. The shelf life of an unopened bottle is 24 months; it should be stored below 40°C.

To reconstitute the solution, add 125 ±5 ml of deionized or distilled water. (125 ml typically fills the bottle to the bottom of the neck.) The label should be marked to indicate the correct expiration date.

**CALIBRATION:**

Pour Zobell Solution into a sample cup. (Suitable cups are provided in the YSI 3565 Sample Cup Pack.) Clean and rinse the ORP electrode with deionized or distilled water followed by a rinse of 3682 solution before immersing it in the sample cup. Most pH meters that read in millivolts can be used to take redox potential readings.

Use this product with Ag/AgCl or saturated calomel electrode systems. According to the U.S.G.S., the expected redox potential values for the Ag/AgCl and saturated calomel electrode systems in Zobell reference solutions at 25°C are 231 ±10 mV and 185 ±10 mV respectively.

At 25°C, the reference voltage of the Ag/AgCl and saturated calomel electrode systems in Zobell Solution varies inversely with temperature according to the following equations. T is in °C.

$$E(\text{Ag/AgCl}) = 0.231 + 0.0013 (25-T) \text{ Volts}$$

$$E(\text{calomel}) = 0.185 + 0.00164 (25-T) \text{ Volts}$$

The effects of temperature on oxidation-reduction reactions, which form the basis for redox potential measurements, are small but should be considered for temperatures higher or lower than 25°C. Redox poten-

tials for Ag/AgCl and saturated calomel electrode systems in Zobell reference solution are shown in the following table:

TEMPERATURE in °C	Ag/AgCl (4M KCl) in millivolts	CALOMEL in millivolts
-5	270.0	234.2
0	263.5	226.0
5	257.0	217.8
10	250.5	209.6
15	244.0	201.4
20	237.5	193.2
25	231.0	185.0
30	224.5	176.8
35	218.0	168.6
40	211.5	160.4
45	205.0	152.2
50	198.5	144.0

The YSI 3682 Zobell Solution is not for food or drug use and can be harmful if swallowed. It will react with acids to form harmful by-products, including hydrocyanide gas. The enclosed Material Safety Data Sheet should be reviewed by the user. Dispose of this product in accordance with all Federal, State and Local Environmental Regulations and Laws concerning health and pollution.

**REFERENCES**

National Handbook of Recommended Methods for Water Data Acquisition, United States Geological Survey, Chapter 2.

"Studies on Redox Potential of Marine Sediments," Bulletin of the American Association of Petroleum Geologists, 30, 4, pp. 477-513, Tulsa, Okla.

Midgeley, Derek, Potentiometric Water Analysis., 1978.

National Handbook of Recommended Methods for Water Data Acquisition, United States Federal Interagency Work Group on Designation of Standards for Water Data Acquisition, 1972.

Yellow Springs Instrument Company, Engineering, Water Quality Group, Design and Computation Book 1, Zobell Calibrator Solution Weekly Chart.

Field Applications in Hydrogeology, Hydrogeology Group, Department of Earth Sciences University of Waterloo, Ontario, Canada, 1981.

Label, drawing number S004725A, YSI 2363 Potassium Ferrocyanide, YSI Incorporated, Yellow Springs, Ohio.

Material Safety Data Sheet for Potassium Ferrocyanide Trihydrate and Potassium Ferricyanide, YSI Incorporated.